IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:  Kevin J. Ryan

Title:  PIPELINED PACKET-ORIENTED MEMORY SYSTEM HAVING A UNIDIRECTIONAL

COMMAND AND ADDRESS BUS AND A BIDIRECTIONAL DATA BUS

| | |
|---|---|
| Docket No.: 303.306US4 | Serial No.: 09/434,654 |
| Filed: November 5, 1999 | Due Date: N/A |
| Examiner: Unknown | Group Art Unit: 2751 |

Assistant Commissioner for Patents
Washington, D.C. 20231

We are transmitting herewith the attached:

X    Communication Re: Incorrect Filing Receipt (1 pg.)

X    Copy of Filing Receipt (1 pg.)

X    Copy of Express Mail receipt and postcard filed with the application (1 pg.)

'X    Copy of the first page of the application (1 pg.)

;X    Copy of the Preliminary Amendment filed with the application (10 pgs.)
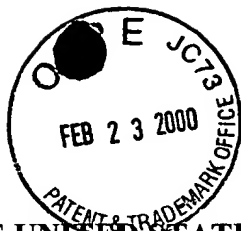
X    A return postcard.

No Additional fee is required.

CERTIFICATE UNDER 37 CFR 1.8:  The undersigned hereby certifies that this Transmittal Letter and the paper, as described above, are being deposited in the United States Postal Service, as first class mail, in an envelope addressed to: Assistant Commissioner for Patents, Washington, D.C. 20231, on this 17 day of ___February___, 2000.

SCHWEGMAN, LUNDBERG, WOESSNER & KLUTH, P.A.
P.O. Box 2938, Minneapolis, MN 55402 (612-373-6900)

By: _Daniel J. Kluth_
Name: Daniel J. Kluth
Reg. No. 32,146
DJK:CMG:wkr

FEB 2 3 2000

## IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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| Applicant: | Kevin J. Ryan | Examiner: Unknown |
| Serial No.: | 09/434,654 | Group Art Unit: 2751 |
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## COMMUNICATION RE: INCORRECT FILING RECEIPT

Assistant Commissioner for Patents
Washington, D.C. 20231

Applicants hereby request correction of the Filing Receipt with respect to the above-identified patent application. In the Filing Receipt received December 14, 1999, (copy enclosed), we have noted the following errors: incorrect filing date, incorrect title and incorrect number of total claims. The correct filing date is: *11/05/99*, as evidenced by the Express Mail receipt and postcard filed with the application (copy enclosed). The correct title is: *PIPELINED PACKET-ORIENTED MEMORY SYSTEM HAVING A UNIDIRECTIONAL COMMAND AND ADDRESS BUS AND A BIDIRECTIONAL DATA BUS*, as evidenced by the first page of the application (copy enclosed). And the total number of claims, as amended is: *28*, as evidenced by the Preliminary Amendment, filed with the application (copy enclosed).

Applicant would appreciate the above-identified printing error be corrected and that a new "corrected" filing receipt be sent to Applicant's representatives at the address given below.

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I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to Assistant commissioner for Patents, Washington, D.C. 20231, on _Feb 17, 2000_
Date of Deposit
_Daniel J. Kluth_

Date _Feb. 17, 2000_

Respectfully submitted,

KEVIN J. RYAN

By his Representatives,

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Minneapolis, MN 55402
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By _Daniel J. Kluth_
Daniel J. Kluth
Reg. No. 32,146
DJK:CMG:wkr

PTO-103X
(Rev. 6-89)

**FILING RECEIPT**

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| APPLICATION NUMBER | FILING DATE | GRP ART UNIT | FIL FEE REC'D | ATTORNEY DOCKET NO. | DRWGS | TOT CL | IND CL |
|---|---|---|---|---|---|---|---|
| 09/434,654 | 11/25/99 | 2751 | $1,450.00 | | 5 | 31 | 10 |

303.306US4

N/A          CMG

**COPY**

SCHWEGMAN LUNDBERG WOESSNER & KLUTH PA
P O BOX 2938
MINNEAPOLIS MN 55402

Receipt is acknowledged of this nonprovisional Patent Application. It will be considered in its order and you will be notified as to the results of the examination. Be sure to provide the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION when inquiring about this application. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. If an error is noted on this Filing Receipt, please write to the Office of Initial Patent Examination's Customer Service Center. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts of Application" ("Missing Parts Notice") in this application, please submit any corrections to this Filing Receipt with your reply to the "Missing Parts Notice." When the PTO processes the reply to the "Missing Parts Notice," the PTO will generate another Filing Receipt incorporating the requested corrections (if appropriate).

**Applicant(s)**   KEVIN J RYAN, EAGLE, ID.

CONTINUING DATA AS CLAIMED BY APPLICANT-
    THIS APPLN IS A DIV OF   08/886,753 07/01/97

IF REQUIRED, FOREIGN FILING LICENSE GRANTED 12/07/99
TITLE
PIPELINED PACKET-ORIENTED MEMORY SYSTEM HAVING A UNDIRECTIONAL
COMMAND AND ADDRESS BUS AND A BIDIRECTIONAL DATA BUS

PRELIMINARY CLASS: 711

TC 2700 MAIL ROOM
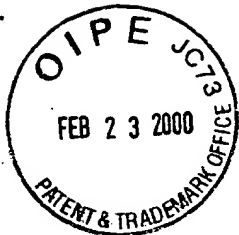MAR 27 2000
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Schwegman, Lundberg
Woessner & Kluth, P.A

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DATA ENTRY BY: HINES, BRENDA          TEAM: 06 DATE: 12/07/99

**(See reverse for new important information)**

OIPE JC73
FEB 2 3 2000
PATENT & TRADEMARK OFFICE

In re Patent Application of: Kevin J. Ryan
Title: PIPELINED PACKET-ORIENTED MEMORY SYSTEM HAVING A UNIDIRECTIONAL COMMAND AND ADDRESS BUS AND A BIDIRECTIONAL DATA BUS
Attorney Docket No.: 303.306US4

DIV

**Receipt is hereby acknowledged for the following in the United States Patent and Trademark Office:**

CONTENTS: UTILITY PATENT APPLICATION (DIVISIONAL): Specification ( 27 pgs, including claims numbered 1 through 31 and a 1 page Abstract); Formal Drawing(s) ( 5 sheets); Copy of signed Combined Declaration and Power of Attorney ( 3 pgs) from prior application; Check in the amount of $1,450.00 to pay the filing fee; Information Disclosure Statement ( 1 pgs); Form 1449 ( 1 pgs) ;Preliminary Amendment ( 11 pgs); return postcard and transmittal sheet.

**EXPRESS MAIL LABEL NO. EM287845817US**
Mailed: November 5, 1999
DJK/tmp

JC564 U.S. PTO
09/434654
11/05/99

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FROM: (PLEASE PRINT) PHONE _____

SCHWEGMAN LUNDBERG
WOESSNER & KLUTH P A
PO BOX 2938
MINNEAPOLIS MN 55402-0938

303. 306US4 TMP

TO: (PLEASE PRINT) PHONE _____

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# PIPELINED PACKET-ORIENTED MEMORY SYSTEM HAVING A UNIDIRECTIONAL COMMAND AND ADDRESS BUS AND A BIDIRECTIONAL DATA BUS

## Field of the Invention

5      This invention relates generally to the field of memory devices, and more particularly to a pipelined packet-oriented synchronous DRAM interface.

## Background of the Prior Art

10      Conventional memory devices have a standard interface consisting of separate address, data and control pins. For example, one version of a synchronous dynamic random access memory (SDRAM) has twelve address pins, two multiplexed address and control pins, seven control pins and sixteen data pins. This approach offers a great deal of flexibility since computer systems vary greatly in

15      their memory requirements. In particular, the bandwidth of memory systems using SDRAMs can easily be increased by adding another SDRAM in parallel to the existing SDRAMs, thereby increasing the width of the memory bus.

The tradeoff for this flexibility is, however, an increase in layout space which leads to an increase in manufacturing cost. Separate traces need to be run for

20      each pin of each SDRAM. Therefore, it is sometimes cost prohibitive to use SDRAMS for wide memory systems.

One approach to lower the cost of expanding memory is to use memory devices which multiplex address, control and data information on the same pins. For example, some memory devices have a set of generic interface pins which

25      connect to a high-speed, synchronous bus. Communication over the bus is accomplished by a series of packets which conform to a predefined packet protocol. Usually the packet protocol is fairly sophisticated and has a complete command set. For example, DRAMS conforming to the RAMBUS™ interface communicate using a protocol in which each packet consists of six bytes transmitted sequentially over a

30      high-speed bus known as a "Channel." In this manner, the packets encapsulate all address, control and data information.